Galton reminds us that, during the first days of a traveller's meeting with a very different race, he finds it impossible to distinguish one from another, without making a special effort to do so: to him the whole race looks alike, excepting distinctions of age and sex. The reason of this is that, by short contacts with many individuals, he receives upon his retina, and has recorded upon his memory, a composite picture emphasizing only what is common to the race, and omitting the individualities. This also explains the common fact that resemblances among members of a family are more patent to strangers than to the relatives.

The individuals entering into these composites were all photographed in the same position. Two points were marked on the ground glass of the camera; and the instrument was moved at each sitting to make the eyes of the sitter exactly coincident with these points. The composites were made by my assistant, Mr. B. T. Putnam, who introduced the negatives successively into an apparatus carefully constructed by himself, and essentially like that designed by Mr. Galton, where they were photographed by transmitted light. The arrangements of the conditions of light, &c., were such that an aggregate exposure of sixty-two seconds would be sufficient to take a good picture. What was wanted, however, was not an impression of one portrait on the plate, but of all the thirty-one; and to do this required that the aggregate exposure of all the thirty-one should be sixty-two seconds, or only two seconds for each. Now, an exposure of two seconds is, under the adopted conditions, too short to produce a perceptible effect. It results from this, that only those features or lines that are common to all are perfectly given, and that what is common to a small number is only faintly given, while individualities are imperceptible. The greater the physical resemblances among the individuals, the better will be the composites. A composite of a family or of near relatives, where there is an underlying sameness of features, gives a very sharp and individual-looking picture.

It would be difficult to find thirty-one intelligent men more diverse among themselves as regards facial likeness than the academicians entering into this composite. They are a group selected as a type of the higher American intelligence in the field of abstract science, all but one or two being of American birth, and nearly all being of American ancestry for several generations. The faces give to me an idea of perfect equilibrium, of marked intelligence, and, what must be inseparable from the latter in a scientific investigator, of imaginativeness. The expression of absolute repose is doubtless due to the complete neutrality of the portraits.

Fig. 3 contains eighteen naturalists and thirteen mathematicians, whose average age is about 52 years. Fig. 1 contains twelve mathematicians, including both astronomers and physicists, whose average age is about $51\frac{2}{3}$ years. Fig. 2 is a composite of sixteen naturalists, including seven biologists, three chemists, and six geologists, with an average age of about $52\frac{1}{2}$ years.

I may mention, as perhaps only a remarkable coincidence, that the positives of the mathematicians, and also of the thirty-one academicians, suggested to me at once forcibly the face of a member of the Academy who belongs to a family of mathematicians, but who happened not to be among the sitters for the composite. In the prints this resemblance is less strong, but in these it was observed quite independently by many members of the Academy. So, also, in the positive of the naturalists, the face suggested, also quite independently to myself and many others, was that of a very eminent naturalist, deceased several years before the sitting for this composite.

There is given also a composite (Fig. 4) of a differently selected group. It is of twenty-six members of the Corps of the Northern Transcontinental Survey—an organisation of which I had charge, and the object of which was an economic survey of the North-Western Territories. It was a corps of men carefully selected as thoroughly trained in their respective departments of applied geology, topography, and chemistry, and having the physique and energy, as well as intelligence, needed to execute such a task in face of many obstacles. The average age of this group was 30 years. RAPHAEL PUMPELLY

HOW THE NORTH-NORWAY FJORDS WERE MADE

IN NATURE (vol. xxx. p. 202) there was published an article by me "On Northern Norway under the Glacial Age," in which, among other subjects, I referred to the course of the travelled granite blocks in the neighbourhood of Tromsö. The researches I had then made in this direction were, however, confined to a limited area, whilst last summer I was able to extend the same to the point whence the blocks started. Although one of my assumptions in the former article has not been confirmed by my last researches, the conclusions I then arrived at have in the main been corroborated. And as I believe that this subject is one of considerable importance to science, I venture to give an account of my last researches.

In order to understand the subject, it is necessary to explain the orographical conditions along the course of the travelled blocks from the Swedish frontier to the Arctic Ocean.

From the eastern end of the Alt Lake, near the Swedish frontier, and northwards to the Store Rosta Lake, the country on the Norwegian side assumes the form of an extensive alpine plateau, with broad depressions, the average height of which is about 2000 feet, running between low rounded ridges. In the south-eastern part of these plateaux, not far from the eastern end of the Alt Lake, the Divi River rises. Having for some 10 graphical English miles followed the plateau, this river flows gradually towards the Divi Valley, which it enters and follows throughout its whole course in a north-easterly direction, flowing eventually into the Maals River at a height of 260 feet (82 m.) above sea-level. Its length, from where it leaves the plateau, to the spot where it joins the Maals River, is about 30 geographical miles. In its upper course, where the Maals River receives the Divi River, the former flows through a wide plain or low plateau, the so-called Överbygd, which gradually slopes down to a distinct valley, the Maals Valley proper, which runs in a westerly direction along the southern slope of the high, island-shaped mountain ridge called Mauken. The latter begins about 5 miles west of the spot where the Divi River enters the Maals River, whence it runs in a direction east-west for a length of about 15 geographical miles, the highest tops being upwards of 4000 feet (1255 m.). On the north-western side, however, the Överbygd gradually rises towards the broad mountain depression filled by the Tag Lake, 7 miles in length, which runs in a direction east-west along the northern slope of Mauken, viz. between the latter and the more northerly-lying ridge Omasvarre, which, with tops upwards of 1900 feet (596 m.) in height, also runs in a direction east-west. The bottom of this depression is filled with the imposing Tag Lake, which lies on a height of about 600 to 700 feet (188 to 220 m.) above sea-level, and thus about 400 feet (120 m.) *higher* than the Divi River at the spot where it enters the Maals River. At the western end of the Tag Lake this depression takes the form of a broad mountain basin, the so-called Tag Valley, which in a north-easterly direction descends to Balsfjord. The distance between the Tag Lake and the Balsfjord is about 10 geographical miles. The Tag Valley is, on the western side, bordered by the lofty Maartin peaks, and further to the north-east by the Slet

Mountain, which, like an arm of the Maartin peaks, gradually slopes down to the Balsfjord.

The line of depression from the spot by the frontier where the Divi River rises, to the bottom of the Balsfjord which we have thus followed, is about 50 geographical miles in length. The course of the Balsfjord is north-westerly, but very crooked, between mountains upwards of 4000 feet (1255 m.) in height. The latter are, however, not continuous, but separated into island-like parts by deep depressions, which, in a recent geological period, when the level of the sea was 300 to 400 feet (91 to 126 m.) higher than at present, must have been submerged, thus making each part an island. In spite, therefore, of the typical fjord character of the Balsfjord, it was originally only a number of sounds, by which it was once connected with the Malangen Fjord on the western, and the Sörfjord, Ulfsfjord, and Lygenfjord on the eastern side. This is a circumstance of great orographical importance, and which deserves every attention, particularly because it does not apply to the Balsfjord alone, but is a characteristic of the formation of every fjord in the north of Norway from Salten (Bodö) in the south to Lyngen in the north—*i.e.* from 67° to 70° N. lat.

From the bottom to the mouth, in a sound between the mainland and the south-eastern side of the great island, Kvalö, the length of the Balsfjord is about 30 miles. At the Troms Island, which lies about five miles to the north of the mouth of the Balsfjord, this sound is divided into two narrow sounds, about five miles long, on each side of the Troms Island. From the northern point of this island these sounds reunite, and the sound becomes the broad Gröt Sound on one side, which, running in a northerly direction, joins the Ulfsfjord at its mouth by the Fugle Sound—a broad arm of the sea cutting into the land. On the other side, the sound is also connected with the open sea by the Kval Sound, 10 to 15 miles long, which runs in a westerly direction, between the two great islands Kvalö and Ringvadsö. The length from the mouth of the Balsfjord to the end of the Kval Sound by the ocean is about 30 miles, or about the same as the length to the end of the Gröt Sound. Thus, from the bottom of the Balsfjord to the sea the distance described is about 60 miles.

As regards the depth of the Balsfjord and the adjacent sounds, it may be mentioned that that of the former varies from 80 to 100 fathoms (480 to 600 feet = 151 to 188 metres), but from the mouth of the fjord towards the Troms Island the depth steadily decreases, being, in the sounds on both sides of it, not more than 20 to 30 fathoms (120 to 180 feet = 38 to 56 m.). To the north of this island, in the Gröt Sound, on the other hand, the depth increases to 100 or 120 fathoms. In the eastern half of the Kval Sound the depth is from 20 to 30 fathoms, while in the western half it reaches, at the mouth, 120 fathoms. It will therefore be seen that the depth of this channel in the main increases seawards, if we except the two places by the Troms Island and in the Kval Sound, the shallowness of which may be caused by narrowness of the sounds, and the consequent opportunity for the deposit of marine *débris*.

Thus, the entire length of the line of depression we have examined from the sources of the Divi River to the ocean is 96 geographical miles, while the bottom of the same falls from 2000 feet above the level of the sea to 720 feet below it—*i.e.* a total fall of 2720 feet.

The geological structure of the mountains here is very remarkable. A large mass of granite which appears at each end extends inland far into Sweden, and, on the Norwegian side, reaches the upper Divi Valley. The rock is composed of orthoclase, microlin, plagioclase, a great deal of quartz, but very little mica. The colour is reddish, the structure granulated. At the other end of the line we have followed, on the Kvalö and Ringvadsö Islands, there are several masses of a grayish, streaky gneiss-granite, rich in mica, closely allied to the gneiss-masses found here. Petrographically, the Divi Valley and the coast granites are so different, that it seems at first sight very easy to distinguish them, but this is not so easy with the variations of the two kinds.

The mountains which project into these granite-masses are built of layers of crystalline slate, and travelled blocks of this material may be found everywhere; but as it would be a matter of great difficulty to refer these to their original birthplace, I shall not take them into account here. We will, therefore, only follow the course of the granite blocks travelling from the Swedish frontier to the coast.

There are two roads by which they might have moved, viz., one from the southern part of the granite-mass along the Alt Lake to Bardö, and so on; the other more northerly, along the Divi Valley. It is the latter which I intend to discuss here.

The above-mentioned alpine plateaux are strewn with travelled granite blocks, and that the same have travelled westwards from the granite masses by the frontier cannot be doubted. The same applies to all the blocks strewn along the Divi Valley. At the spot where the Divi River joins the Maals River the travelled blocks have followed two courses—viz. one through the Maals Valley, along the mountain Mauken—which we shall not follow—and the other in a north-westerly direction across the Överbygd to the Tag Lake, the lower parts of the Överbygd being thickly strewn with granite blocks which, judging by their petrographical composition, I am sure belong to the Divi Valley granite. Hence the course of the blocks can be traced along the depression in the mountain by the Tag Lake, not only at the bottom, but high up on the mountain sides. Thus, the northern slope of the Mauken is everywhere, up to a height of 2500 feet (784 m.), strewn with travelled granite blocks; indeed the brink of every terrace looks—seen from below—as if it were faced with travelled blocks, which everywhere seem to belong to the Divi Valley granite. Travelled granite blocks were found, too, strewn up the slopes of the Omasvarre Mountain to a height of 1200 feet (376 m.)—viz. as far as I was able to carry my researches. I believe they would be found right up to the top.

From the western end of the Tag Lake the blocks have moved along the Sag Valley, and then to the bottom of the Balsfjord. The flat stretch of shore, 210 feet broad, high, and covered with loose *débris*, is strewn with blocks which without doubt belong to the Divi Valley granite.

From what I have thus explained we may safely assume that an enormous mass of inland ice has once moved from the frontier through the above-described channels, down to the Balsfjord, and that it must, along the Mauken, a distance of 10 miles from the fjord, still have maintained a height of at least 2500 feet (784 m.) above the then sea-level.

Before we follow the course of the blocks further, I will refer to certain circumstances connected with it thus far. About five miles to the westward of the mountain plateau near the frontier rises the isolated mountain Store Jerta to a height of 4500 feet (471 m.)—viz. about 1000 feet (314 m.) higher than any of the surrounding mountains. The Store Jerta is throughout built of hard crystalline slate. On the very summit of this peak I found a large block of granite which I feel confident is a travelled block from the granite mass to the east of it. Its birthplace must in that case have been at least 1000 feet (314 m.) *lower*, and, as the Store Jerta has been situated right in the track of the ice-stream from the east, I am of the opinion that the ice has been screwed up here to a very great height; but I confess it seems hardly possible to understand that it could be to such an enormous height.

I have stated above that the Tag Lake lies 42 feet *higher* than the spot where the Divi River enters the

Maals River, and supposing that this was also the case during the Glacial age the ice-stream must have moved up an incline before it could reach the depression leading down to the Balsfjord. This cannot, however, have been the case. As long as the ice-stream had perfect liberty to travel *down* an incline—here present in the shape of the broad Maals River, along the southern slope of the Mauken—it would hardly ever move in the opposite direction *up* an incline, leaving, however, local accumulations out of consideration. It might therefore be reasonable to suppose that the configuration of the land along the Divi Valley, and especially the Överbygd, was very different during the Glacial age. A continuous, though slightly inclining, surface must under these circumstances at that period have extended from the alpine plateaux above the Divi Valley to the depression along the Tag Lake, and the present configuration be caused by subsequent erosion. It should be stated that the outlet of this lake does not now follow the course of the ice-stream towards the Balsfjord—which might have been reasonably assumed—but is at the opposite, eastern, end towards the Maals River. This seems to indicate that the present declivity of the Överbygd in an easterly direction in any case cannot be older than the close of the Glacial age.

As stated, travelled granite blocks from the Divi Valley are found in great numbers along the northern slope of the Mauken, towards the Tag Lake, upwards of 2500 feet (784 m.); but that these should have been raised from lower levels to their present height seems improbable. The northern slope of this mountain does not lie transversely to the course of the ice-stream, but longitudinally to it. Of course the screwing-up of the ice may also take place in the latter case, but I should say only in isolated spots; this cannot have been the case along the Mauken. Neither is it possible that the bottom of the lake lay at that level in the Glacial age. It must then have lain lower than the alpine plateaux by the frontier, and even if we allow for enormous glacial erosions, it would be impossible to believe that the bottom then lay at such a height. As the blocks on the Mauken cannot thus have been deposited along the bottom of the ice-stream, nor brought thither through screwing-up of the ice, we must assume that they have been deposited from the surface of the ice-stream. The latter being strewn with blocks, which at the frontier was above 3000 feet (941 m.) high, has therefore, at 40 or 50 miles therefrom, had a height of 2500 feet. The surface can, therefore, under this long journey, only have had a very small declivity outwards.

From the western end of the Tag Lake the great ice-stream has moved forward to the Sag Valley, which, being then as it is at present, has been able to receive it and turn it in a north-westerly direction downwards to the Balsfjord. That the Sag Valley cannot be of glacial origin, produced by erosion, is clear from the very nearly acute angle it forms with the Tag Lake depression. It might also be assumed that the ice-stream here might have moved forward across the Slet Mountain and the long, narrow peninsula between the Malangen and Balsfjord, but that this was not the case is proved clearly by the circumstance that travelled granite blocks are found on this peninsula, or only at low levels, which I shall presently explain.

It may be probable that the ice-stream from the Tag Lake has met another descending from the Maartinder in the Sag Valley, but there is no middle *moraine* proving this. On the other hand, travelled granite blocks are but sparsely strewn along the north-western side of the Sag Valley, at the foot of the Slet Mountain. Should the Sag Valley, therefore, be of glacial origin, it might more naturally be attributed to the ice-stream from the Maartinder, but even then eroded before the great inland ce-stream entered it. If, however, this was the case, the former ice-stream must have been in motion long before the latter, of which there is no probability.

We therefore come to the conclusion *that the basin of the Balsfjord, viz., the Tag Lake depression and the Sag Valley, cannot be the result of the erosive action of the inland ice, but that it existed prior to the Glacial age, and that, in fact, the depression in question was the cause of the ice-stream taking this course.*

We will now follow the depression through the fjord and adjacent sounds.

As soon as we leave the true bottom of the fjord the travelled blocks are differently situated to those inland. There are plenty of granite blocks to be found, but *they are everywhere confined to lower levels, viz., from the shore-line up to* 120 *feet* (38 *m.*). *Above, there is none, and the line of disappearance is very marked.* My researches have extended, on the eastern side of the fjord, from the bottom to the sea; on the western side, though they do not extend so far, they go to show that the conditions there are identical with those on the eastern side. It is particularly significant that neither here are the blocks found above a height of 120 feet along the low, transverse ridge which runs from the Balsfjord on one side westwards to the Malangenfjord, and on the other, eastwards to the Lyngen and Ulfs fjords. Thus, the outer Malang isthmus, which, rising slowly to a height of 400 feet (125 m.), leads from the Bals to the Malang fjords, is along the former strewn with blocks, but only at lower levels. Above 120 feet they disappear. From this also it is clear that the inland ice cannot have moved forward across the Slet Mountain and the isthmus between the Bals and Malangen fjords, previously referred to. From the bottom of the Nordkjos, a short bye fjord of the Balsfjord, running eastwards, the Balsfjord isthmus, two miles long, with a height of 250 feet (78 m.), leads to the bottom of the Storfjord in Lyngen. Here, too, the blocks are confined solely to lower levels towards the Nord and Balfs fjords. The blocks have not reached as far as across the isthmus to the Storfjord.

The blocks may in the same manner be followed along the Ramfjord, which as a bye fjord runs from the mouth of the Balsfjord eastward to the Bredvik Isthmus. From the southern side of the mouth of the Ramfjord the Anders Valley runs in a southerly direction between lofty mountains and with a steady incline. Here, too, travelled granite blocks are found to a height of 120 feet, *but not a single one above.* The case is the same along the sounds around the town of Tromsö. Further, I have followed the blocks northwards, on the mainland to Tunnes, about five miles from the town, but whether they have travelled further along the Gröt Sound I have not yet been able to ascertain. The same applies to the Kval Sound. But researches made on the islands *outside* this sound prove beyond a doubt that the granite blocks from the Balsfjord cannot have reached these islands by way of the Kval Sound.

The greatest number of travelled blocks along the Balsfjord belong, judged petrographically, to the Divi Valley granite, blocks which might with certainty be referred to the coast granite not having been found. Along the sounds, too, the greatest number of blocks, if not all, may be referred to the Divi Valley granite; but blocks belonging to the gray, streaky gneiss-granite of the Kval Island are also met with here, some of which may even be referred to exact localities in the island. Among the rocks along the Troms Island and adjacent sounds blocks of a coarse-grained syenite are also often found. In the Divi Valley no varieties of syenite appear, but they are often encountered combined with gneiss and gneiss-granite on the coast. Although I have not yet succeeded in finding syenite in place which with certainty can be said to be petrographically identical with that of these travelled blocks, I have every reason to believe that they hail from the west.

We have now followed the course of the blocks along a continuous distance of 84 geographical miles—viz. 48 on the mainland and 36 on the shores of fjords and sounds.

From what I have advanced here as regards the blocks during their journey through the Balsfjord, it seems clear that their transport here cannot be ascribed to a moving stream of inland ice. The sharp line of demarcation, above which no blocks are found, seems in itself to demonstrate this. The line extending for miles along a long fjord and extensive sounds, and being so sharply defined, bespeaks that the transporting agency at work here must have been far more regular during a length of time than a stream of inland ice possibly could be. We have therefore every reason to conclude *that these blocks have been carried along the level of the sea on drift-ice*, i.e. *shore-ice*. As the block-transport appears from the first simultaneously along the long stretch of shore from the Balsfjord, and past the Troms Island, a strong in- and outflowing current during the diurnal tides has in all probability been at work at a period when the level of the sea was 120 feet higher than at present. And the strong drift of the ice outwards *must have been stronger than the one inwards up the fjord*. Travelled blocks of the Kval Island granite are, therefore, *not found in the interior of the fjord*, but the case is different along the broad sounds about the mouth of the fjord; here the in- and outflowing currents have had alternate sway, *and here are also found blocks of the Divi Valley, as well as of the coast granite.*

There is another important circumstance which beyond a doubt proves that the inland ice during the Glacial age cannot have moved along this fjord, scouring the bottom. Thus, if we consider the present depth, about 600 feet, and remember that the level of the sea during the Glacial age was about 600 feet higher than at present, and further that great quantities of *débris* must have been deposited at the bottom of the ice, it is evident that an ice-stream moving through the fjord, and a sixth part of whose volume rose above the then sea-level, must have reached several hundred feet above the former—that is, the outgliding stream must have reached several hundred feet above 120 feet, the line of demarcation for the blocks, as it then lay at least 200 feet below the sea. If, however, this had been the case, granite blocks should now be found at a far greater height than 120 feet. Neither can the Balsfjord during the Glacial age have formed a valley along which the inland ice might move, as, in this case, travelled blocks would have been found along the sides at even far greater heights.

I have, therefore, after the most careful researches here, yard by yard, and extending over many years, come to the conclusion *that the Balsfjord is not of glacial origin, but formed an incision or depression in the mountains of older origin than the Glacial age.* And this conclusion I believe *may, in the main, apply to the question of the formation of all fjords in the north of Norway.* But whether it is applicable to all fjords *in the whole of Norway* I shall not attempt to answer.

There may, however, be reason to assume that the explanation of the fjord-formation in parts which have lain under an earlier Glacial age as being of glacial origin, is rather based on speculation than such careful and minute researches as those I have referred to here, and which may, perhaps, contribute to prove the correct theory.

KARL PETTERSEN

Tromsö Museum

VARIABLE STARS[1]

THIS catalogue may be regarded as complemental to the "Catalogue of Known Variable Stars," by the same author, which was read before the Royal Irish Academy, January 28, 1884. It contains a list, including lettered numbers, of 745 stars in which some change of magnitude is suspected. The stars are tabulated in order of Right Ascension for the epoch 1880·0, and in separate columns are to be found particulars of the supposed change of magnitude and the authority on which the supposed change rests. In the "Notes and Observations" by which the Catalogue is followed are given particulars of the history of each star, together with observations by the author of such stars as have received attention from him. The work is accompanied by a map showing the distribution of known and suspected variable stars.

A catalogue of this character forms a valuable working catalogue for the observer's use. By further observation suspected variation will in some cases be proved to be real, and the stars claim a place in a catalogue of known variables. A claim of this kind might indeed already be made in the case of Nos. 234, 455, and 635 of Mr. Gore's list. It may just be mentioned in passing that the place of No. 234, U Canis Minoris, is incompletely given in the Catalogue. Its more exact place for 1880 is R.A. 7h. 34m. 49s., Decl. + 8° 39′·5. There are other cases in which, though the period is as yet indeterminate, the fact of variation and its amount may be stated with some confidence. On the other hand further observation may tend to throw a doubt on the suspicion of change in the case of other stars, and (as our author observes) "these must of course be removed from future catalogues." In the notes to No. 287 of his Catalogue α Hydræ, Mr. Gore quotes remarks by Sir John Herschel, Dr. Schmidt, and Dr. Gould to the effect that the supposed variability of this star may possibly be due to the influence of its ruddy colour on the estimates of its brightness. Is it not possible that the effect of colour on estimates of magnitude as respects different observers, or the same observer at different times, has hardly received so much attention as it deserves?

Large as is the number of stars included in Mr. Gore's Catalogue, further additions might be made to it. Comparing it, for instance, with the Table of Suspected Variables extracted from Mr. Chandler's unpublished Catalogue by Prof. Pickering, and printed in his "Recent Observations of Variable Stars" in the *Proceedings* of the American Academy, we find some 30 stars which are not included in Mr. Gore's list, and it is probable that others might be found in other quarters also. Indeed the experience of most variable star observers would probably suggest the view that cases of slight but distinctly recognisable light variation are relatively numerous.

A word in regard to No. 445 in the Catalogue may possibly help to avert the chance of a little confusion in the future. This star was entered as U Bootis in Prof. Schönfeld's first Catalogue of Variable Stars, but was rejected by him in his "Zweiter Catalog." There is another star called U Bootis by Mr. Baxendell in a paper in the Manchester Lit. and Phil. Soc. *Proceedings*, vol. xxi. No. 11, the place of which, brought up to 1880, is R.A. 14h. 48m. 47s., Decl. + 18° 10′·9. This star has a period of 175·5 days, with a range of magnitude from about 13·5 at minimum to about 9·2 at maximum.

In conclusion we commend to the attention of all who are interested in the subject of variable stars a work the preparation of which must have entailed on the author a considerable amount of labour both as compiler and observer.

[1] A Catalogue of Suspected Variable Stars, with Notes and Observations, by J. E. Gore, M.R.I.A., F.R.A.S. A paper read before the Royal Irish Academy, May 12, 1884.

NOTES

A BERLIN telegram announces the sudden death of Dr. Emil Riebeck, at Feldkirch, where he was preparing for another five years' journey. Our first review in this week's NATURE refers to some of the last results of Dr. Riebeck's journeys. Either directly or indirectly he has done good work for science in